Progress Report on "Cross Talk" in the Near Detector

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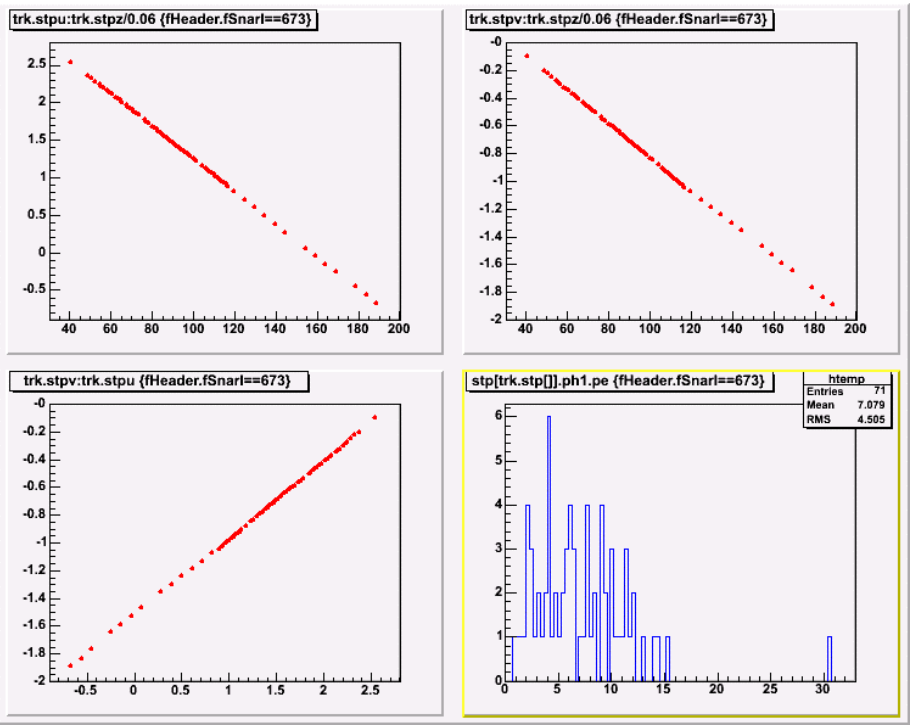
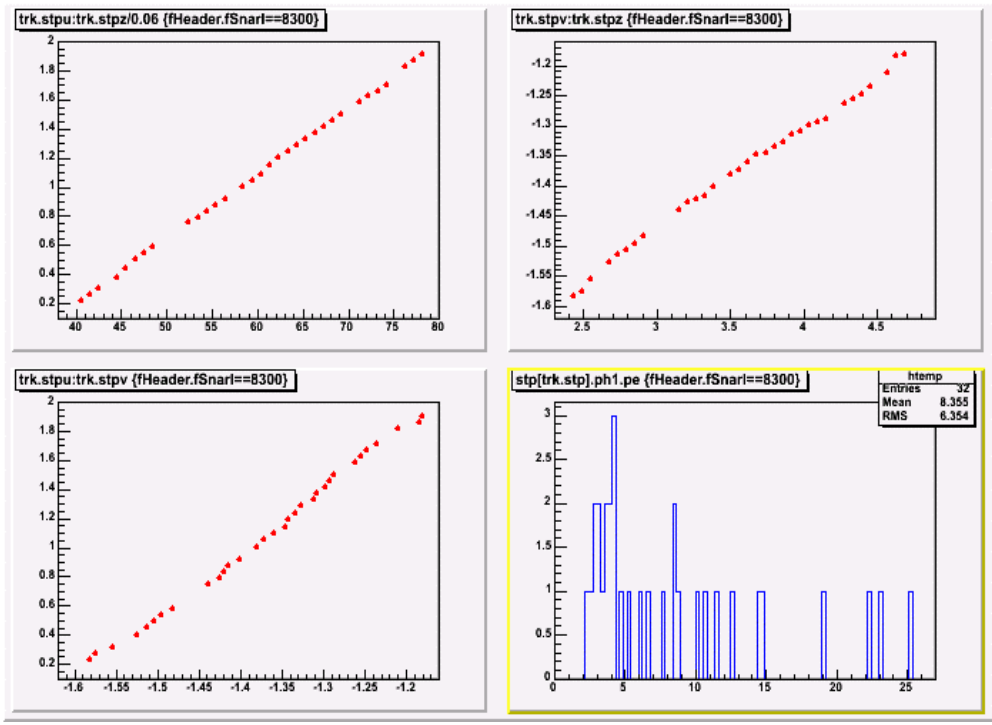
3D Muons…

- We were able, thanks to the DAQ group, to take physics runs (Geoff implemented a 10/12) trigger with most of the detector instrumented (just 9 planes missing) and for both views.

- We processed the events with the Standard Minos Offline code, after fixing some problems related with digits with error code (Robert and I discussed that in the previous reconstruction meeting) and saw nice muons…

3D Muons…





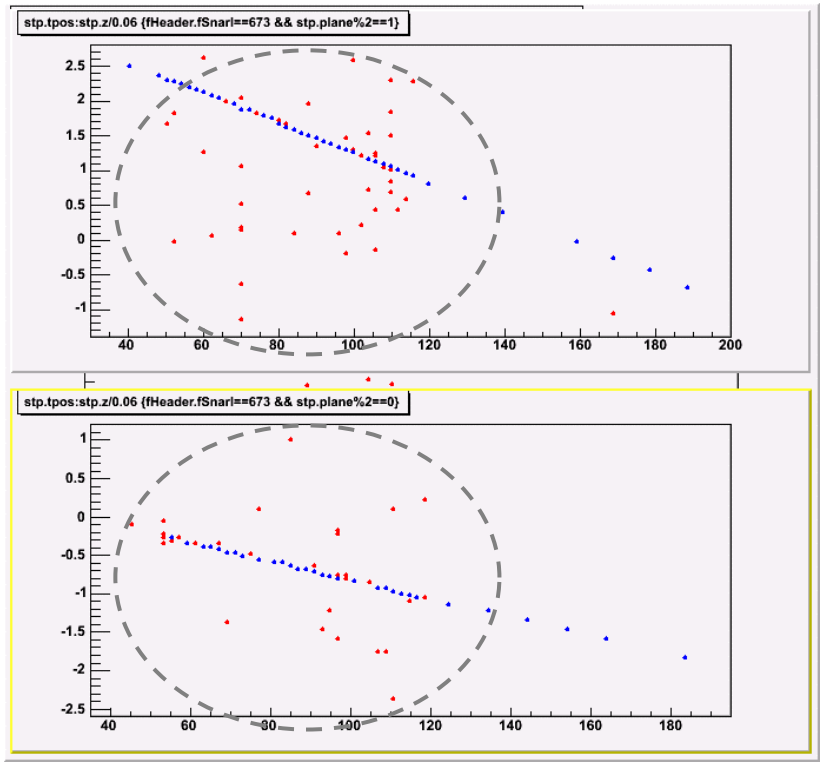
Reconstructed Muon

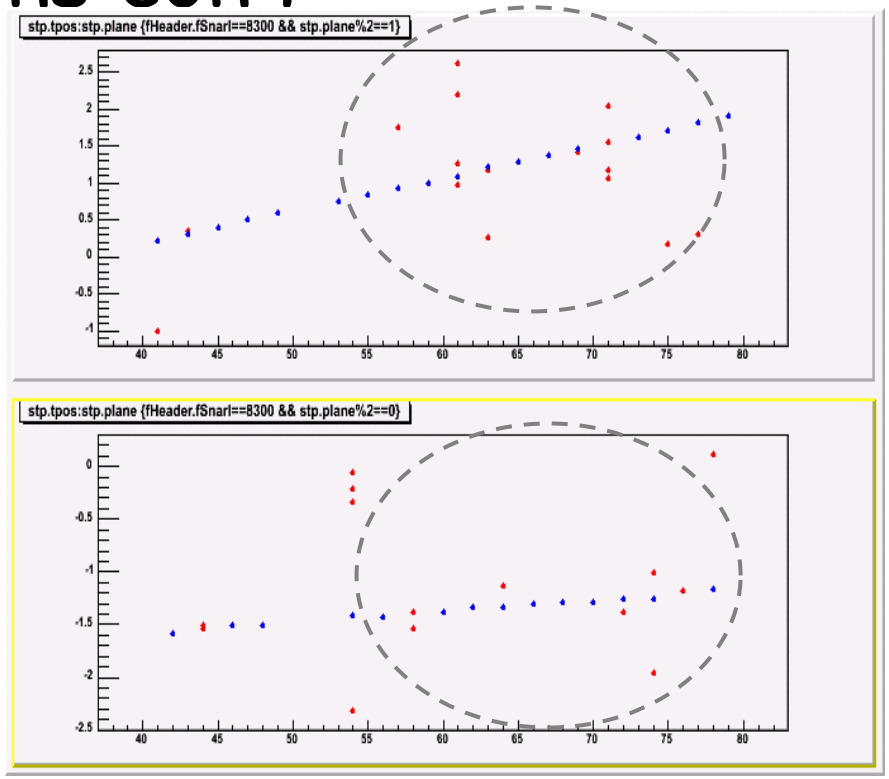
Top : U vs Z, V vs Z

Bottom : U vs V and PE distribution

- The number of PE's per plane is ~ 8 which is quite close to what expected given the fact that there is no calibration applied at the moment.

3D Muons con't

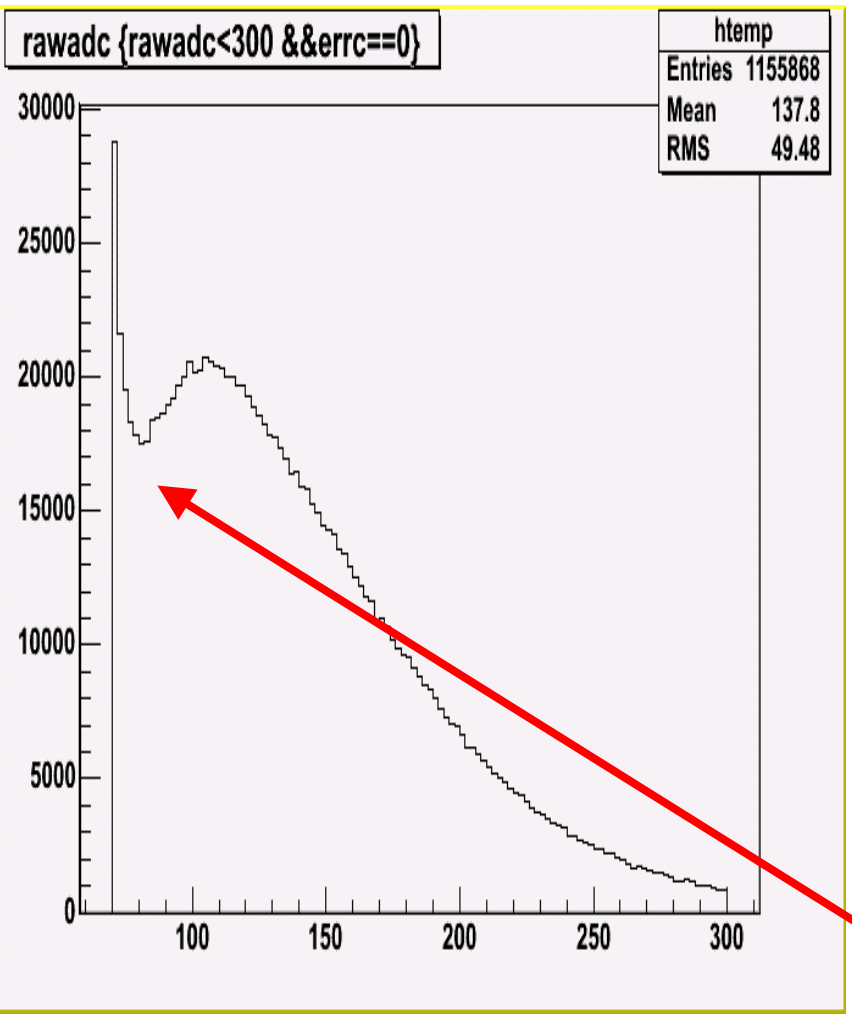




Event with the Reconstructed Muon
(Red: all hits, Blue: Muon hits)
Top : U vs Z
Bottom: V vs Z

- Apart from the clear muon tracks, there is a lot of activity in the detector accompanying them whose origin should be investigated …

Additional activity in the ND @ cosmic muon runs.



Raw ADC distribution of all strips/channels with no pedestal subtraction

N.

- One possible explanation to this phenomenon could be cross talk…

However there are a few important things that we should take under consideration before we draw quick conclusions:

- The HV for these few cosmic muons runs was ON for approximately 10 minutes before we took the runs. PMTs that are not stabilized behave in a "funny" way and are in general noisy.
- The electronics are not properly calibrated. We now that this can cause a large number of digits passing the sparcification threshold that are actually mis-calibrated pedestals.
- I am not sure that the sparcification and dynode thresholds are properly tuned to the cut of ~ 1/3 PE, or equivalently that we fully understand the Pedestal distribution. We seem to be seeing the tail of the pedestal distribution, something that is not expected if the Pedestal is at ~50 ADC counts with a sigma of 2 ADC counts.

Additional activity in the ND @ cosmic muon runs cont'd.

- The "cross talk" explanation to the additional activity we see, is certainly worth examining (now and also when we run with more stable conditions) and Panos has already started working on this subject:

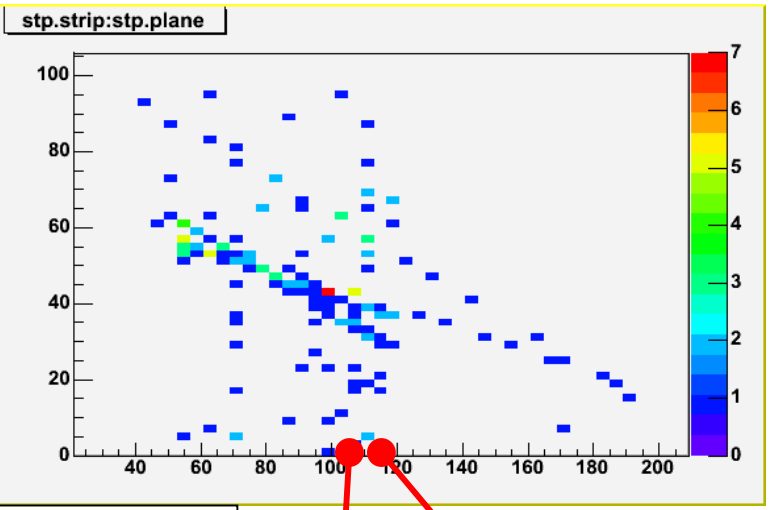
- Pixel number added to the NtpSR ntuple output variables (for each digit)

- Try to check "spatial distribution" of hits on the PMT face and see if they are neighbors.

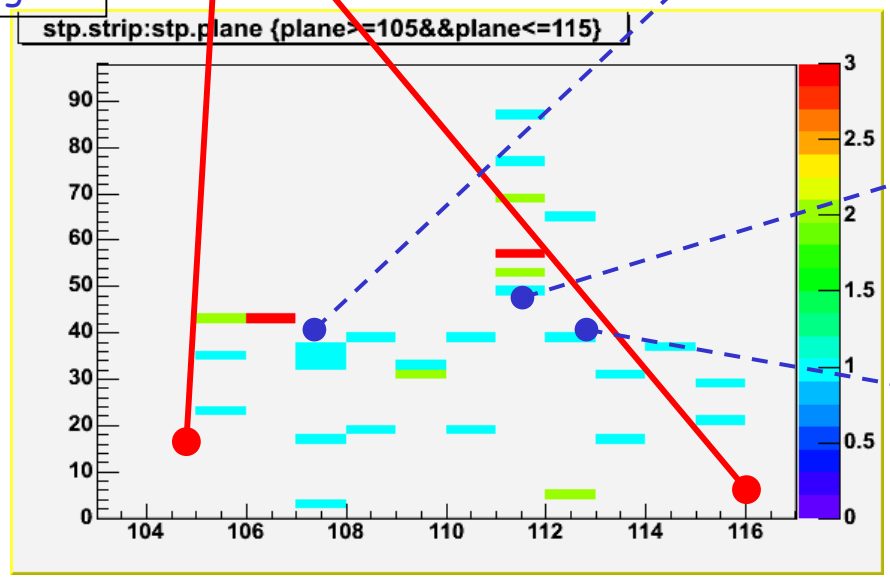
One Example:

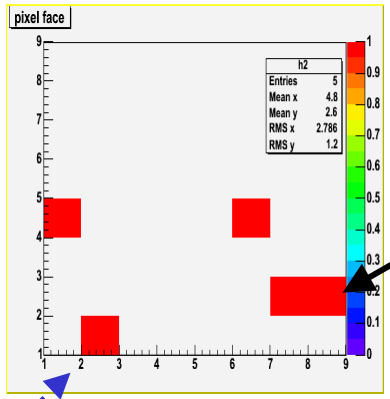
Event 673

strip vs plane, digit occupancy



zooming...

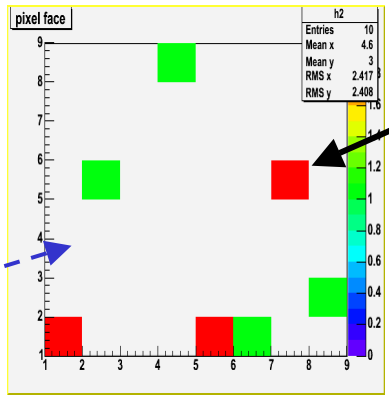




Plane 107

PMT face

Track hit

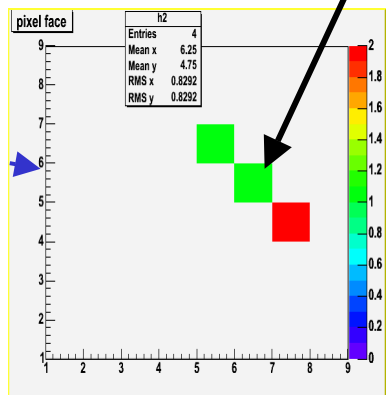


Plane 111

Track hit

Track hit

Plane 112



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Summary - Plans

• We need to take cosmic runs with more stable conditions to eliminate various sources of "noise" to our detector.

•The "x-talk" pixels are not always neighbouring to the "track hit" pixel, and their spatial distribution seems quite random.

•Since we expect a very small fraction of "x-talk" hits (1% of the overall charge ~ 0.08 PE's) the "x-talk" as well as other possible sources of the "noisy" tracks should be carefully investigated.

•Need to automate the process of checking, and produce "summary maps" of x-talk.

•Incorporate minder/menu (channel) information in the SR ntuple, to see possible electronics effects.